RESPIRATORY FUNCTIONS OF COMMON PEOPLE AND SPORTMANS DWELLING ADJACENT VILLAGES OF SUGAR FACTORIES IN MAHARASHTRA

A
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INTRODUCTION

Industrialization, today, emerges a new culture of modern human society. The industrial revolution has brought about tremendous change in the ecology and environment of man and the earth. Although industrial technology is a blessing to human society, it has equal and opposite reaction towards destroyable threat not only to a human life but also to the lives in the earth. Modern industries expire a large number of gases and particles and can cause a serious health problem in industrialized nations. Waste from mechanical and chemical industries is exhausted into the air, much the way a car puts out fumes from its tailpipe. These substances combine with ozone in the air to produce smog, which when inhaled causes breathing difficulties and can kill susceptible people.

Further, the sugar industry, in India is the second largest producer of sugar over the globe, with more than 45 millions of sugar cane growers in the country. The sugar industry is the second largest agricultural industry, followed after or by the textile industry. Sugar industry in India is well maintained and is growing at a steady pace, boosting up a consumer base of over all billions of people. The sugar industry is the second largest agro-based industry in India as well as in Maharashtra also. In fact, Sugar cane is an important commercial crop in the state. From cultivation of sugar cane to its refinement, is still one of the most important regional industries in the districts of Western Maharashtra. Sugar cane is the primary raw material for all major sweeteners produced in the state. It also supports two important cottage industries i.e. Jaggery and Khandsari industries. Sugar industry produces certain byproducts. The important byproducts are molasses, bagasse, which is used for production of chemicals and alcohol. Bagasse is utilized as a fuel in the boilers and also used as a raw material in the paper industry, press-mud also mixed with another residual output of the distillery viz. Spent wash and used as bio-manure.

However, though the sugar industries in Maharashtra have influenced the economic condition but somewhere along it, the health aspect due to pollution of these industries is overlooked. Most commonly and easily affected human organ is the lungs due to any organic or inorganic dust to which the workers and the residents nearby these industries are exposed. It is well known that the industrial dust

inhalation over a long period leads to proliferative and fibrotic changes in the lungs. Talking of exposure to dust, it was found that the frequency of respiratory illness was greater among the exposed workers than non-exposed. Significance of pulmonary function in assessing responses to various airborne pollutants has been known since middle of the 20 century, and large number of studies have been undertaken to assess the effect of dust on lung functions in various occupations.

Inhalation of bagasse dust, the byproduct, causes disease of respiratory system known as “Bagassosis” which is nowadays described under the broad heading of hypersensitivity pneumonitis and is also termed as a variant of farmers' lung . The cane sugar is not only utilized for production of sugar, but also the fiber is utilized in the manufacture of paper, cardboard and rayon and therefore bagassosis is seen in all these industries also.

Hence, the researcher of this study intends to see the status of pulmonary function of people dwelling nearby sugar industries present in Western Maharashtra.

Statement of the Problem

In recent years, a strong awareness has grown on the effects of environmental air pollution on the human respiratory tract. Increase in bronchitis, chronic cough and asthma among the population has been recorded with exposure to pollutants, even below standard international levels (Andrae *et al.,* 1988). Besides chemical pollutants, large quantities of organic dust particles are also released into the air of various agricultural industries. The dust emitted by these factories contains high concentrations of bioaerosols, such as bacteria, actinomycetes, and fungi of plant and animal origin. The concentration and pathogenicity of these bioaerosols depend on source materials, method of their storage, technology of processing materials and their disposal (Dutkiewicz, 1997). These bioparticulates play an important role in triggering respiratory allergic ailments and nonspecific inflammatory reactions in the lungs of exposed subjects (Pauli *et al.,* 1989 & O’Hollaren *et al.,* 1991).Occupational exposure to organic dust and endotoxin may cause various respiratory diseases, including asthma, allergic alveolitis, chronic bronchitis, toxic

pneumonitis (Grammer 1999; Lacy 1994; Milanowski 1998; Rylander & Jacobs 1994), as well as acute and/or chronic lung function impairment (Post, Heederik, &Houba 1998; Schwartz et al., 1995; Zock 1998; Zuskin E, Mustajbegovic J, Schachter 1994).

Although, many researchers have worked on the impact of different organic dusts on respiratory function but bagassosis which is observed in sugar factory workers has not been explored. The studies conducted in western countries on spirometer reported that air pollution reduces FVC (Buechner, Bhitz & Thompson 1958; Castleden & Hamilton 1942; Gillison & Taylor 1942; Sodeman & Pullen 1944), FEV1 (Jenkins & Mallik 1971; Miller & Hearn1971; Ronald & Patric 1993), MVV (Buechner, Bhitz & Thompson 1958; Nair & Das 1970; Weill & Burchner 1966), PEFR (Nair & Das 1970) including VC, TLC, PEFR, and MVV (Vishwanathan *et al.,*1963).

Furthermore, the research findings reveal that the vital capacity of the lungs is a critical component of good health. Vital capacity is an important concern for those with asthma, heart conditions, and lung ailments; those who smoke; who work in industries or live near the industries and those who have no known lung problems. Above all these problems people generally have tendency to take inapproriate or shallow breathing that me means less oxygen getting to the brain and muscles, which increases physical tension as body tries to adjust to the new demands placed on it. Ordinarily, we don't notice that we aren't using our lungs fully until something causes us to take a deep breath.

Hence it was considered appropriate by the researcher to investigate the respiratory fitness problems faced by the factory workers and the people dwelling near the factories. To achieve this purpose, in the light of the above, it was proposed to study entitled, “Respiratory Functions of Common People Dwelling Adjacent Villages of Sugar Factories in Western Maharashtra.”

Problem and its Relevance

Respiratory ailments associated with work place have been reported by various authors (Jarvinen *et al.,* 1979; Pandit and Singh, 1994; Popp *et al.,* 1989; Singh *et al.,* 1998 & Zuskin *et al.,* 1992) from different countries among workers in different agricultural facilities, such as sugar refineries, granaries, bakeries, poultry farms, swine farms, tanneries, etc. There is substantial evidence that workers handling grain dust develop respiratory symptoms (Swan and Crook, 1998). Epidemiological surveys pertaining to various forms of respiratory dysfunction are of paramount importance and are carried out as regular programmes in several countries (Love *et al.,* 1988; Musk *et al.,* 1989). Such studies have been lacking in India and need to be performed to obtain statistics of people suffering from occupational respiratory disorders. Nevertheless, a study conducted by Nene and Shete (2011) indicates decline in FVC, PEFR, FEF 25 - 75 and MVV in sugarcane industry workers. In fact, numerous studies are conducted on industry workers but little or no evidence is available regarding status of pulmonary function of the people dwelling adjacent Villages of Sugar Factories in Western Maharashtra. Therefore, researcher has planned this investigation to find out the status of respiratory function among the people living nearby sugar factories.

Purpose and Objectives

This study is planned to see the respiratory functions of common public dwelling near to sugar factories in western Maharashtra. To accomplish the purpose, following objectives have been considered:

- To survey the status of respiratory function of the villagers dwelling adjacent to the sugar industries.

- To survey the status of respiratory function of the sports person dwelling adjacent to the sugar industries.

- To compare the respiratory function of the sports person and common people dwelling adjacent to the sugar industries.

- To compare the respiratory function of the male and female villagers dwelling in the villages situated nearby the sugar industries.

Hypotheses

The available research literature and general experience about the air pollution by sugar cane industries help to hypothesize that-

H_1: Sugar industries would affect the respiratory function of male than the female villagers residing in the nearby villages.

H_2: Respiratory function of the villagers and sports person dwelling nearby different sugar factories would be different.

Delimitation of the Study

- This study will be delimited to the public residing within the range of 10 kms distance from sugar cane factories situated in the various districts of Western Maharashtra.

- The respiratory status of the male and female residents of nearby sugar cane factories, will be measured.

Scope and Limitations of the Study

- This study will not include all the villagers due to time constraint and paucity of fund for data collection. Thus, this study left further scope for the future researchers to tackle such problem with the involvement of large number of sample.

- It is expected that the number of female participants will be very less as compared with the males. The expected reason may be - many of the female subjects will be restricted by the family members not to participate, even

though the researcher will consult the Sarpanch (i.e., Gram Pradhan) and the guardian of the families.

- Though there may be various health disorders due to pollution but the researcher will not be able to test all such parameters.
- Moreover, the respiratory function of these subjects as attributed by other associated disorders may be beyond the scope of this study.

Significance of the Study

This study is significant in the following ways:

- This study will help the people residing nearby villages to realize their respiratory fitness.
- This study may assist common people to search for a remedy to get rid of respiratory problems or look for different available ways to reduce the pollution created by factories.
- This study will guide not only workers in western Maharashtra region but also the same professionals belonging to other states as well as other industries to cope up such respiratory problems.
- This Study will help researchers to continue further extensive research on this topic.

Operational Definitions of Terms Used

Respiratory Function

The respiratory system is an integrated series of organs and openings designed to deliver oxygen-rich air to the lungs. It is essential that the lungs and the airways be clear, unobstructed, and fully functional. The body has no alternate means of counteracting or compensating for a substandard respiratory system. Typical conditions that impair respiratory function in people are asthma (an often chronic inflammation of the lungs and its airways), the bronchial tubes that restrict the passage of air into the lungs, and the congestion of the lung with fluids caused by common colds and infections. Thus, the respiratory function refers one's ability of the respiratory organs to forceful exhalation of lungs' air to the extreme after a deepest inhalation.

Sugar Factories

This refers to sugar cane factories that produce sugar which is one of the essential commodities of human beings. The expiration of these factories generates foul gas which is very difficult to tolerate by common people who are not habituated to expose in it. In western Maharashtra, the production of sugar seems to be higher in the districts of Sangli and Kolhapur.

METHODOLOGY

Population

The population of this study will be the villagers and sports person age range of 25 to 70 years, residing near sugar factories in different districts of Western Maharashtra. The villagers and sports person will be selected in such a way so that they are dwelling within the range of 10 kms distance from the sugar cane factories.

Sample

The researcher will select randomly at least 25% of the sugar factories available in Western Maharashtra region. About 1500 males and females subjects of the age group 25 to 65 years (i.e., 25-40 yrs, 41-55 yrs, and 56 to 70 yrs), residing near these factories will be sample for research. Simple random sampling technique will be used for this study.

Criteria of Selecting Subjects

- The subjects staying adjacent (within 10 Kms range) to sugar factories in Western Maharashtra region will be included as subjects.

- The subjects suffering from acute pulmonary disease will be discarded from this study.

- The subjects who are willing to participate will be included.

Variables and Tools to be used

Pulmonary function of the male and female subjects will be assessed. The investigator will use spirometer (computerized digital) to assess the status of pulmonary function.

Research Design of the Study

This will be a descriptive survey or an assessment study, which aims to describe the status of a phenomenon (i.e., status of respiratory function of the people residing within 10 kms range of sugar cane factories which are situated in the villages of western part of Maharashtra) at a particular point of time. This technique, in fact, will be adopted in this study.

Data collection

The investigator will locate the place (address) of sugar cane factories situated in western part of Maharashtra. The region-wise i.e., Taluka-wise location of

the factories will be identified and then 25% of the factories will be identified. Thus, the identification of the sugar cane factories will be made on the basis of stratified random sampling.

After identification of the 25% of the sugar cane factories situated at the western part of Maharashtra, nearby villages located within the range of 10 Kms will be identified and then data on pulmonary function will be collected with the permission of the local Panchayat.

Data analysis

The data will be analysed on percentage-basis. This will help to assess the percentage of people residing nearby sugar cane factories suffering from respiratory problem. Chi-square test will be employed to compare the intensity of suffering from respiratory problem between the sex-wise workers and non-workers of the factories.

CHAPTERIZATION

The report of the thesis will be written in five chapters viz., *introduction, review of related literature, methods, analysis and interpretation, and summary, conclusion and recommendations*.

Schedule for Completion of Research Work

Sr. No.	Month and Year	Work to be completed
1	May-August 2016	○ Completion of draft project proposal ○ Finalization of project proposal in consultation with guide. ○ Presentation of research proposal. ○ Modifications in proposal if suggested.
2	September-December 2016	○ Identification of villages located nearby sugar industries. ○ Summarization of purpose of project to the villagers and the sports person dwelling adjacent to sugar industries. ○ To sign the consent letter. ○ To fix the suitable dates for data collection.
3	January 2017-March 2017	○ Finalization and preparation of list of villages and the subjects to be participated in the study. ○ Communication and Procurement of pc-based spirometer on rent for data collection. ○ Standardization and get acquainted with the use of instrument.
4	April-June 2017	○ Data collection.
5	July-October 2017	○ Review of literature ○ Writing of introduction
6	November 2017-January 2018	○ Acquisition of data ○ Sorting of Data ○ Analysis of data
7	February – May 2018	○ Completion of first draft of thesis ○ Correction of thesis in consultation with research guide ○ Preparation of synopsis
8	June-July 2018	○ Submission and presentation of synopsis ○ Pre viva
9	August-September 2018	○ Finalization of thesis ○ Submission of thesis

REFERENCES

Andrae, S., Axelson, O., Bjorksten, B., Fredriksson, M. N., & Kjellman, I. M. (1998). Symptoms of bronchial hyperreactivity and asthma in relation to environmental factors. *Arch Dis Child, 63*, 473–478.

Buechner, H. A., Bhitz, O., & Thompson. (1958). Bagassosis: A review with further historical data, studies of Pulmonary function and results of adrenal steroid therapy. *American Journal of Medicine, 25*, 234.

Castleden, & Hamilton Paterson. (1942). Bagassosis An industrial lung disease. *British Medical Journal, 2*, 478-480.

Dutkiewicz, J. (1997). Bacteria and fungi in organic dust as potential health hazard. *Ann Agric Environ Med, 4*, 11–16.

Gillison, J. A., & Taylor, I. (1942). Bagassosis- further notes of four cases. British Medical Journal, 14, 577-578.

Grammer, L. C. (1999). Occupational allergic alveolitis. *Ann Allergy Asthma Immunol*, *12*, 602-606.

Jarvinen, K. A. J., Pirila, V., Bjorksten, F., Keskinen, H., Lehtinen, M., & Stubb, S. (1979). Unsuitability of bakery work for a person with atopy: a study of 234 bakery workers. *Ann Allergy, 42*, 192–195.

Jenkins, D. E., & Mallik, S. K. (1971). Sequence observations on pulmonary functional derangements in bagassosis. *Archives of Inter. Medicine., 128*, 535-540.

Lacey, J., & Dutkiewicz, J. (1994). Bioaerosols and occupational lung disease. *J Aerosol Sci*, *25*, 1371-1404.

Love, R. G., Smith, T. A., Gurr, D., Soutar, C. A., Scarisbrick, D. A., & Seaton, A. (1988). Respiratory and allergic symptoms in wool textile workers. *Br J Ind Med, 45*, 727–741.

Milanowski, J. (1998). Organic dust - induced lung diseases. *Current Pneumology*, *2*, 15-20.

Miller, G. J., & Hearn, C. E. D. (1971). Pulmonary function at rest and during exercise following bagassosis. *British Journal of Industrial Medicine, 28*, 152-158.

Musk, A. W. *et al.,* (1989). Respiratory symptoms, lung function and sensitization to flour in a British bakery. *Br J Ind Med, 46*, 636–642.

Nair, K. V., & Das, K. V. (1970). Bagassosis –A case report. *Journal Ass. Physc. India, 18*(6), 573-575.

O'Hollaren, M. T., Yunginger, J. W., Offord, K. P., Spomers, M. J., O'Connell, E. J., Ballard, D. J., & Scahs, M. I. (1991). Exposure to an aeroallergen as a possible precipitating factor in respiratory arrest in young patients with asthma. *New Engl J Med, 324*, 359–363.

Pandit, T., & Singh, A. B. (1994). Saccharomyces cerevisiae (yeast) a potential aeroallergen for workers of sugar industry. *Indian J Aerobiol, 22*, 13–19.

Pauli, G., Bessot, J. C., & Quoix, E. (1989). Effect of the environment on the development of respiratory allergies. *Rev Pneumol Clin, 45*, 231–236.

Popp, W., Zwick, H., Steyrer, K., Rauscher, H., & Wanke, T. (1989). Sensitization to aeroallergen depends on environmental factors. *Allergy, 44*, 572–575.

Post, W., Heederik, D., & Houba, R. (1998). Decline in lung function related to exposure and selection processes among workers in grain processing and animal feed industry. *Occup Environ Med*, *55*, 349-355.

Ronald, Jalleh., Michael, F., Fitz, Patric. (1993). Alcohol and cor-pulmonale in chronic bronchitis and emphysema. *British Medical Journal, 306*, 374.

Rylander, R., & Jacobs, R. R. (1994). *Organic Dusts. Exposure, Effects and Prevention*. Boca Raton, FL : Lewis Publishers.

Schwartz, D. A., Thorne, P. S., Yagla, S. J., Burmeister, L. F., Olenchock, S. A., Watt, J. L., & Quinn, T. J. (1995). The role of endotoxin in grain dust-induced lung disease. *Am J Respir Crit Care Med*, *152*, 603-608.

Singh, A., Prakash, D., & Singh, A. B. (1998). Sensitization to different species of Aspergillus in bakery workers and general atopic population. *Asian Pacific J Allergy Immunol, 16*, 5–15.

Sodeman & Pullen. (1944). Bagasse disease of the lungs. *Archives of Internal Medicine, 73*(5), 365.

Swan, J. R. M., & Crook, B. (1998). Airborne microorganisms associated with grain handling. *Ann Agric Environ Med, 5*, 7–15.

Viswanathan, R. A., de Monte, J. H., Shivpuri, D. N., & Venkitasubramoni, T. A. (1963). Bagassossis. *Ind. J. of Med. Res.51*, 563–693.

Weill, H., & Burchner, H. (1966). Bagassosis: A study of pulmonary function in 20 cases. *Annales of Internal Medicine, 64*(4), 737.

Zock, J. P., Hollander, A., Heederik, D., & Douwes, J. (1998). Acute lung function changes and low endotoxin exposures in the potato processing industry. *Am J Ind Med*, *33*, 384-391.

Zuskin, E., Kanceljak, B., Schachter, E. N., Wiltek, T. J., Mustajbegovic, J., Maayani, S., Buck, M. G., & Reinzi, N. (1992). Immunological findings and respiratory function in cotton textile workers. *Int Arch Occupp Environ Health, 64*, 31-37.

Zuskin, E., Mustajbegovic, J., & Schachter, E. N. (1994). Follow-up study of respiratory function in hemp workers. *Am J Ind Med*, *26*, 103-115.

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